

## EPIDEMIOLOGICAL SCIENCE

## 2022 EULAR points to consider for remote care in rheumatic and musculoskeletal diseases

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#### ABSTRACT

**Background** Remote care and telehealth have the potential to expand healthcare access, and the COVID-19 pandemic has called for alternative solutions to conventional face-to-face follow-up and monitoring. However, guidance is needed on the integration of telehealth into clinical care of people with rheumatic and musculoskeletal diseases (RMD).

**Objective** To develop EULAR points to consider (PtC) for the development, prioritisation and implementation of telehealth for people with RMD.

**Methods** A multidisciplinary EULAR task force (TF) of 30 members from 14 European countries was established, and the EULAR standardised operating procedures for development of PtC were followed. A systematic literature review was conducted to support the TF in formulating the PtC. The level of agreement among the TF was established by anonymous online voting.

**Results** Four overarching principles and nine PtC were formulated. The use of telehealth should be tailored to patient's needs and preferences. The healthcare team should have adequate equipment and training and have telecommunication skills. Telehealth can be used in screening for RMD as preassessment in the referral process, for disease monitoring and regulation of medication dosages and in some non-pharmacological interventions. People with RMD should be offered training in using telehealth, and barriers should be resolved whenever possible.

The level of agreement to each statement ranged from 8.5 to 9.8/10.

**Conclusion** The PtC have identified areas where telehealth could improve quality of care and increase healthcare access. Knowing about drivers and barriers of telehealth is a prerequisite to successfully establish remote care approaches in rheumatologic clinical practice.

#### INTRODUCTION

The prevalence of rheumatic and musculoskeletal diseases (RMD<sup>1</sup>) ('A diverse group of diseases that commonly affect the joints, but can also affect the

#### Key messages

##### What is already known on this subject?

- Remote care and telehealth can improve healthcare access and outcomes, particularly in the treatment of chronic diseases.
- The COVID-19 pandemic made the use of telehealth even more frequent in rheumatology, with ad hoc implementation of remote care services in several centres.
- Guidance is needed on how remote care and telehealth should be developed and integrated into long-term rheumatology clinical care.

##### What does this study add?

- These points to consider indicate how telehealth should be developed and implemented in routine clinical care of people with rheumatic and musculoskeletal diseases (RMD).
- They cover several aspects including screening for RMD, preassessment in the referral process, disease monitoring and modification of medication dosages and non-pharmacological interventions.
- The task force identified drivers and barriers to telehealth, which may support a timely implementation in clinical practice.
- These points to consider can be used to tailor telehealth to needs and preferences of people with RMD.

##### How might this impact on clinical practice or future developments?

- These points to consider can guide the development of national and local telehealth strategies to support best clinical practice.

muscles, other tissues and internal organs') in developed countries has increased by 60% from 1990 to 2010 and is expected to continue rising. An ageing population, earlier diagnosis and improved survival among people with RMD are the main reasons for the increased prevalence.<sup>2,3</sup> Compounded by

a relative drop in the number of rheumatologists<sup>4</sup> and other healthcare providers (HCPs), the pressure on the healthcare system has increased.<sup>5,6</sup> Waiting times for a new or follow-up rheumatology appointment have grown, hampering implementation of guidelines for good clinical care.<sup>7</sup> Alternative forms of care using telehealth for follow-up of people with RMD and for self-management interventions may preserve and even improve quality of care.

Remote care makes use of digital technologies—so-called ‘telehealth’ interventions.<sup>8</sup> It is used in all parts of the patient pathway, including communication with patients/caregivers, disease screening or monitoring of different aspects of the disease (eg, disease activity, damage, quality of life, adherence, etc). It can be delivered synchronously (HCP and patient being present at the same time) or asynchronously and be divided into three main types of modalities: *live video* (synchronous) and the asynchronous modalities: *store and forward* (transmission of recorded health history) and *remote patient monitoring*.<sup>9</sup>

Telehealth can improve healthcare access and outcomes, particularly in the treatment of chronic diseases.<sup>10</sup> It can reduce demands on overstretched facilities and make the health sector more resilient<sup>8</sup> and has become even more relevant during the COVID-19 pandemic when it has been difficult to deliver face-to-face care and investigations as usual.<sup>11,12</sup> Furthermore, the COVID-19 pandemic has resulted in wider use of telehealth services, and remote care has become much more socially acceptable.<sup>13</sup>

However, guidance is needed on how telehealth should be integrated into routine clinical care.

The aim of this EULAR task force (TF) was to formulate points to consider (PtC) for the development, prioritisation and implementation of remote care and telehealth for people with RMD. The target users are people with RMD and their relatives, physicians and other HCPs involved in the care of people with RMD, regulators and policy makers.

In the context of these PtC and following the definition of the WHO, telehealth was defined as: ‘the use of telecommunications and virtual technology to deliver healthcare outside of traditional healthcare facilities’.<sup>8</sup> Remote care was defined as ‘the provision of care using telehealth and virtual technology allowing patients to be evaluated, monitored and possibly treated while the patient and HCP are physically remote from each other’.

## METHODS

This work was conducted using the 2014 updated EULAR standardised operating procedures for developing PtC/recommendations.<sup>14</sup> After approval from the EULAR Executive Committee, the conveners (AdT and CD) and fellows (PB and AM) formed an international TF representing 14 European countries. TF members included one methodologist and two comethodologists (TAS, CBM and YM), rheumatologists (including one representative from EMEUNET), one epidemiologist (also representing EMEUNET), health professionals in rheumatology (nurses, occupational therapists, physiotherapists and one psychologist) and four people with RMD. In preparation for the application of this project to EULAR, a broad scoping review (online supplemental appendix 1) was undertaken to map the current research and knowledge gaps within remote care interventions in rheumatology. A scoping review does not aim to produce a critically appraised and synthesised result nor to answer a particular question, but rather to provide an overview of the contents of effect studies on this topic.<sup>15</sup> As such, the scoping review was presented at the first TC meeting and informed the outlined

research questions and the search strategy in the systematic literature review (SLR): what is the efficacy, safety, cost-effectiveness, user perception and adherence of remote care or blended care as compared with standard care in people with RMD? How is remote care delivered/tailored to people with RMD and integrated into clinical practice? What are the drivers and barriers for implementation of remote care in clinical practice? These questions were transformed into the PICO (Population, Intervention, Comparator, Outcome) format, driving the development of the search strategy for the SLR. The SLR was conducted by the two fellows under the guidance of the methodologist and two comethodologists in accordance with the Cochrane Handbook.<sup>16</sup> The results of the SLR were reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines<sup>17</sup> and have been published separately.

The two TF meetings were held via a virtual online platform. During the first meeting in November 2020, definitions for remote care and telehealth were discussed and the key questions were phrased.

During the second virtual meeting, held in April 2021, the TF members formulated the overarching principles and PtC based on evidence from the SLR and expert opinion, through a nominal group process. Consensus was accepted in the first round if >75% of the members voted in favour of a statement. As all statements were accepted in the first round, no additional rounds were necessary. Finally, each TF member anonymously indicated their level of agreement (LoA) to each statement using Survey Monkey (LoA, 0–10 numeric rating scale ranging from 0 = ‘completely disagree’ to 10 = ‘completely agree’). The mean and SD of the LoA as well as the percentage of TF members with an agreement  $\geq 8$  are presented. The level of evidence was assigned to each statement based on the standards of the Oxford Centre for Evidence Based Medicine.<sup>18</sup>

Finally, a research agenda was formulated based on evidence gaps and controversial points. The final manuscript was reviewed and approved by all TF members and the EULAR Council.

## RESULTS

An overview of the overarching principles and PtC can be found in [table 1](#).

The TF identified key themes considered to apply across all PtC, formulated and agreed on them as four overarching principles. They are not necessarily a direct result of the SLR, but considered to be fundamental aspects of the specific area and form the framework for the PtC.

### Overarching principles

Tailored care combining remote and face-to-face attendance should be based on shared decision-making as well as the needs and preferences of people with RMD

The decision on using remote care should be tailored to the patient’s needs and preferences including demographic, social situation, geographical access to healthcare, employment status, specific diagnosis, comorbidities, disease phase and status, that is, in a newly onset rheumatoid arthritis (RA), a face-to-face visit should be performed, but telehealth may be optimal for education about disease symptoms, disease activity, therapy and self-management. Patients with a well-established diagnosis, stable disease activity and less complex diseases can be offered the use of telehealth solutions.<sup>19</sup> Patients with long-standing, stable RA might require less education and training and their treatment might not need modification. Some of these patients may prefer telehealth consultations rather than hospital visits. Similarly, a

**Table 1** EULAR points to consider for the use of remote care in people with RMD

Overarching principles	LoE	LoA*
A. Tailored care combining remote and face-to-face attendance should be based on shared decision-making as well as the needs and preferences of people with RMD.	n.a.	9.7 (0.7) 96.6%>8
B. Remote care† for people with RMD can be delivered by all members of the healthcare team using a variety of telehealth techniques.	n.a.	9.1 (1.3) 86.2%>8
C. Telehealth‡ interventions should be developed in collaboration with all stakeholders including the healthcare team, caregivers and people with RMD.	n.a.	9.7 (0.7) 100%>8
D. Members of the healthcare team involved in remote care interventions should have adequate equipment and training, as well as telecommunication skills.	n.a.	9.7 (0.7) 96.6%>8
Specific points to consider		
1. Pre-assessment by telehealth may be considered to improve the referral process to rheumatology and help prioritisation of people with suspected RMD.	2b	8.5 (2.1) 82.1%>8
2. Telehealth may assist pre-diagnostic processes for RMD; however, diagnosis should be established in a face-to-face visit.	2b	8.7 (2.0) 71.4%>8
3. The decision to initiate disease-modifying drugs should be made in a face-to-face visit. Telehealth may be used for drug education, monitoring and facilitating adherence.	2b	9.1 (1.4) 89.3%>8
4. Dose modifications or suspension of disease-modifying drugs, as well as addition of analgesics, NSAIDs or glucocorticoids can be discussed with people with RMD using telehealth.	2b	9.3 (1.3) 92.9%>8
5. Telehealth can be used to monitor symptoms, disease activity and other outcomes.	2b	9.6 (0.8) 96.4%>8
6. Telehealth may be used to discuss the need for a face-to-face consultation or other interventions.	2b	9.8 (0.7) 96.4%>8
7. Telehealth should be considered for non-pharmacological interventions including, but not limited to, disease education, advice on physical activity and exercise, self-management strategies and psychological treatment.	2b	9.4 (1.1) 92.9%>8
8. Barriers to remote care should be evaluated and resolved wherever possible.	5	9.7 (0.8) 96.4%>8
9. People with RMD using remote care should be offered training in using telehealth.	5	9.5 (1.0) 96.4%>8

\*LoA, level of agreement (mean (SD)).

†Remote care: the provision of care using telehealth and virtual technology allowing patients to be evaluated, monitored and possibly treated while the patient and HCP are physically remote from each other.

‡Telehealth: the use of telecommunications and virtual technology to deliver healthcare outside of traditional healthcare facilities.

HCP, healthcare provider; LoA, level of agreement; LoE, level of evidence; NSAIDs, nonsteroidal anti-inflammatory drugs; RMD, rheumatic and musculoskeletal disease.

younger patient in full-time employment living far away from the hospital might prefer telehealth, whereas an elderly patient living nearby and with limited access to technology might opt for a face-to-face visit.

Remote care for people with RMD can be delivered by all members of the healthcare team using a variety of telehealth techniques. As is seen in online supplemental table 1, telehealth makes use of different types of technology and modalities. Not all services in the RMD care pathway can be delivered remotely; but allowing for security, feasibility and need, all members of the healthcare team can deliver them. Different services are offered by different HCPs. Interventions within diagnostics, for example, are usually delivered by physicians; whereas interventions on training and exercise are mostly managed by physiotherapists. Monitoring

of disease activity, rehabilitation and self-management interventions may involve different HCPs (online supplemental table 1).

Telehealth interventions should be developed in collaboration with all stakeholders including the healthcare team, caregivers and people with RMD

User involvement by all stakeholders (eg, patients, carers, HCPs and decision-makers) are believed to be important in order to overcome usability issues of telehealth solutions.<sup>20 21</sup> Patients are at the centre of this process, and the goal is to develop user-friendly, intuitive and effective technology that helps to improve healthcare services from a patient's perspective. It is essential to include HCPs in order to reflect daily clinical practice, that is, by letting them propose, which intervention can be delivered remotely and how technology could be incorporated into the overall clinical evaluation and workflow. The involvement of administration personnel and funding bodies is required to guarantee reimbursement of services and to prevent additional bureaucracy to HCPs and patients.

Members of the healthcare team involved in remote care interventions should have adequate equipment and training as well as telecommunication skills

Successful telehealth interventions require that the healthcare team receives training in telehealth communication, interaction, legacy and clinical assessment.<sup>22</sup> Despite great interest, HCPs often are unaware of available telehealth tools<sup>12</sup> and should take responsibility for their ongoing professional development,<sup>23</sup> but healthcare organisations are also responsible for preparing the workforce for telehealth-based clinical practice.<sup>22</sup> In future, telehealth should be incorporated into the existing curricula at universities and other healthcare educational institutions, so that HCPs can develop the skills to provide safe and competent telehealth care.

**PtC 1: Preassessment by telehealth may be considered to improve the referral process to rheumatology and help prioritisation of people with suspected RMD**

Waiting lists within rheumatology are forecasted to become longer in the future.<sup>24</sup> Effective prioritisation is, therefore, key to guarantee rapid access to those patients with the most severe and active diseases. A short preassessment via telehealth may help to decide on this priority, advise patients and other HCPs on which tests should be done and/or whether another specialist should be involved first. The SLR identified one study showing that referrals could be triaged by a nurse practitioner, with a rheumatologist participating in the encounter via a tele-link.<sup>25</sup> Agreement to this statement was lower than to other PtC, mainly because the TF was of the opinion that more evidence is needed about which preassessment methods are most appropriate as well as in which patients and at what level of the referral process they should be applied.

**PtC 2: Telehealth may assist prediagnostic processes for RMD; however, diagnosis should be established in a face-to-face visit.**

During a face-to-face visit, additional information (resulting from personal interaction and clinical and physical examinations) helps to make a diagnosis. For that reason, face-to-face visits are indispensable to rheumatology. The final diagnosis may certainly be made after a face-to-face visit, as well, and discussed with the patient remotely, for example, when the clinician needs to wait for blood tests or images.

Patients with risk factors for developing an inflammatory rheumatic disease (eg, patients with psoriasis without arthritis, people with positive autoantibodies but no inflammatory symptoms and people with positive family medical history for systemic autoimmune disease) would benefit from screening using telehealth techniques. Hence, regular monitoring via telehealth could help to facilitate a face-to-face visit at the appropriate time. In other situations, where diagnosis largely depends on history and imaging (eg, for axial spondyloarthritis), several parts of the prediagnostic process could be handled by telehealth, and a face-to-face visit could be scheduled when treatment is initiated. Evidence indicates that such telehealth interventions may save unnecessary visits, time and resources for patients, the healthcare system and society.<sup>24 26</sup>

**PtC 3:** The decision to initiate disease-modifying drugs should be made in a face-to-face visit. Telehealth may be used for drug education, monitoring and facilitating adherence

The TF agreed that the decision to initiate or change disease-modifying antirheumatic drugs (DMARDs) would usually take place on the background of active disease, requiring a face-to-face consultation. However, a telehealth appointment may be more optimal to reinforce information and education to improve adherence to treatment, especially when the patient is in familiar surroundings and possibly with relatives. The SLR identified evidence that telehealth could be used for drug education, monitoring and facilitating adherence to drugs,<sup>27–29</sup> and that patients believe they can benefit from telehealth-provided drug information, but prefer it to complement face-to-face information rather than replacing it.<sup>30</sup>

**PtC 4:** Dose modifications or suspension of DMARDs as well as addition of analgesics, NSAIDs or glucocorticoids can be discussed with people with RMD using telehealth

In chronic inflammatory arthritis such as RA, optimal sequencing of DMARDs is important as the disease often fluctuates between active disease and remission.<sup>31 32</sup> The SLR identified some evidence that an intensive treatment strategy based on telehealth led to increased remission rates and a decrease in functional impairment.<sup>33</sup> The TF was also of the opinion that telehealth could be used in cases of infection, adverse events or abnormal lab results, where temporal or permanent discontinuation of DMARDs is needed. Furthermore, addition of analgesics, non-steroidal anti-inflammatory drugs (NSAIDs) and glucocorticoids could be prescribed remotely as bridging therapies or to treat minor flares, residual disease activity and comorbidities until patients receive face-to-face assessment.

**PtC 5:** Telehealth can be used to monitor symptoms, disease activity and other outcomes

According to the EULAR treat-to-target (T2T) recommendation, disease activity in inflammatory arthritis should be evaluated every 1–6 months depending on disease activity and severity.<sup>34</sup> Due to resource constraints, a full implementation of T2T in rheumatology practice is still scarce.<sup>35</sup> In patients with low, stable disease activity, telehealth follow-up may be a valid alternative to face-to-face visits, given that this approach can make room for new patients or patients with more complex disease presentation. It may also help to monitor changes or emerging trends during long-term follow-up.

The SLR identified two randomised controlled trials (RCTs) indicating that in patients with sustained remission, telehealth follow-up resulted in similar outcomes, including disease activity,

physical function and quality of life compared with regular face-to-face visits.<sup>36 37</sup>

**PtC6:** Telehealth may be used to discuss the need for a face-to-face consultation or other interventions

Telehealth can be a low-barrier opportunity to get in contact with the healthcare system either by a telephone helpline, a chat function or a secure email service. By doing so, patients can be referred for a face-to-face visit, a specific examination (eg, blood test or imaging) or to another specialist. The SLR identified one RCT showing that telehealth is a good platform for reaching a shared decision between the patient and the HCP.<sup>38</sup> Another study concluded that telehealth can be used to decide whether patients require a face-to-face consultation.<sup>36</sup>

**PtC 7:** Telehealth should be considered for non-pharmacological interventions including but not limited to disease education, advice on physical exercise, self-management strategies and psychological intervention

The SLR identified several studies that supported the use of telehealth as an intervention to promote physical activity and exercise.<sup>39–44</sup> The TF debated the mechanism of delivery of any non-pharmacological intervention considering the possibilities of delivering this entirely face-to-face, remotely or combinations thereof. The TF agreed that it depends on patient factors such as previous experience with the intervention and the intervention itself. Disease education, for example, may not require face-to-face visits, whereas complex physical exercises should preferably be instructed and checked face-to-face.

**PtC 8:** Barriers to telehealth care should be evaluated and resolved wherever possible

Telehealth has the potential to provide access to resources and care, increase flexibility and reduce waiting lists and patient travel time. However, some barriers that might obstruct successful implementation of telehealth must be assessed systematically.<sup>30 41 45–52</sup>

In [table 2](#), we depict a list of possible barriers identified in the SLR and by the TF members and provide suggestions on how these barriers could be resolved. This list is not exhaustive but may form the basis for the development of local checklists enabling implementation of telehealth into clinical practice.

**PtC 9:** People with RMD using remote care should be offered training in using telehealth

Training of members of the healthcare team in telehealth techniques and communication skills was seen as an overarching principle; however, the TF agreed that a separate statement was needed on training people with RMD in using telehealth. Many of the included surveys and qualitative studies refer to problems with digital literacy.<sup>46 52–54</sup> People with RMD should be offered training in using telehealth solutions and should be informed how to prepare for a telehealth consultation (eg, by having questions prepared, sitting in a quiet place, etc). Any member of the healthcare team, depending on the local setting, can offer this training.

Based on the discussions and the areas of uncertainty, a research agenda has been proposed, which is depicted in [box 1](#).

## DISCUSSION

The current paper presents the first EULAR PtC on the use of telehealth in daily clinical rheumatology practice. These PtC can be used to inform and guide the development of national

**Table 2** Identified barriers to telehealth and suggested interventions to overcome them

Factors	Identified barriers	Suggested interventions
Patient factors	Patient reluctance <sup>30 45 47 51 62</sup> Varying digital and health literacy skills <sup>46 47 51 53</sup> Lack of access to necessary equipment <sup>46 54</sup>	<ul style="list-style-type: none"> <li>▶ Integration of digital support into routine patient education</li> <li>▶ Assessment of the patient's health literacy before referral to telehealth care</li> <li>▶ Assessment of the patient's digital skills before referral to telehealth care</li> <li>▶ Assessment of access to required equipment before referral to telehealth</li> </ul>
Clinical factors	No possibility of face-to-face clinical and instrumental examination <sup>45 47 49 63</sup> Disease burden, medical and psychological comorbidity <sup>45 62</sup>	<ul style="list-style-type: none"> <li>▶ Assessment before referral: Will telehealth provide all necessary information needed to make a clinical decision?</li> <li>▶ Assessment before referral: Will telehealth be safe for this patient?</li> </ul>
Healthcare provider factors	Lack of training <sup>48 49</sup>	<ul style="list-style-type: none"> <li>▶ Ensure necessary competencies by providing training on telehealth communication, interaction, legacy and clinical assessment</li> </ul>
Organisational factors	Lack of data security <sup>51 54</sup> Lack of approval for reimbursement from insurance companies <sup>44</sup>	<ul style="list-style-type: none"> <li>▶ Ensure that the telehealth interventions follow national and local obligations on legacy such as privacy and security requirements</li> <li>▶ Involve payers and administration from the beginning in the development of telehealth interventions</li> </ul>

recommendations and local telehealth solution and complement previous EULAR PtC for the development, evaluation and implementation of mobile health application aiding self-management of people with RMD.<sup>55</sup>

Within rheumatology, telehealth has been discussed in the context of the increasing prevalence of RMD and workforce limitations.<sup>2 6</sup> Recently, the COVID-19 pandemic has made telehealth even more relevant with 78% of patients finding it acceptable.<sup>56</sup> A recent EULAR survey conducted in 35 countries showed that during the pandemic, the majority of European face-to-face consultations were converted into telehealth consultations.<sup>46</sup> However, that study also pointed out that more research within tele-rheumatology is needed.<sup>46</sup>

As this is a relatively new research area, the present, PtC are only partially supported by evidence. Furthermore, few of the studies addressed disease monitoring in inflammatory arthritis.<sup>33 36 37 57</sup> PtC 8 (barriers) and 9 (training of people with RMD) are mainly based on qualitative research that is considered low quality of evidence by the Oxford hierarchy.<sup>18</sup> This does, however, not indicate a lower importance of these PtC.

### Box 1 Research agenda

#### Remote care in rheumatic and musculoskeletal diseases—identified unmet needs and suggested focus for future research:

- ▶ To conduct randomised non-inferiority and superiority trials to test the efficacy and patient satisfaction of telehealth interventions as compared with conventional care.
- ▶ To perform longitudinal studies to test if telehealth leads to more or less treatment changes.
- ▶ To evaluate methods of preassessment and prioritisation within different settings and diseases.
- ▶ To evaluate the cost-effectiveness of telehealth interventions.
- ▶ To explore factors associated with digital health literacy (for both, people with RMD and HCPs).
- ▶ To explore barriers to the implementation of telehealth and how they can be solved.
- ▶ To explore how artificial intelligence can be integrated into telehealth interventions in order to support the development of knowledge of clinical processes.
- ▶ To evaluate patient safety and data security when using telehealth in daily clinical practice and in an extended follow-up.

Telehealth has been promoted as a means to increase cost-effectiveness, but this was only addressed in two studies on remote physiotherapy,<sup>58 59</sup> revealing conflicting results.

Furthermore, in some studies, telehealth interventions were applied as an add-on to and not as a replacement of face-to-face contact.<sup>41 42 60 61</sup> This makes a direct comparison between telehealth and face-to-face interventions difficult.

None of the included studies addressed security and potential adverse effects of telehealth interventions. Also, the follow-up time was generally short (mostly  $\leq 1$  year); therefore, it is not possible to make any conclusions about the long-term effects or potential harms of telehealth interventions. It is possible that more longitudinal studies looking at the effects of telehealth as opposed to routine care will become available in the next few years because of the greater shift to remote working during the COVID-19 pandemic.

In conclusion, these PtC identified several areas where telehealth may potentially improve quality of care and increase healthcare access within rheumatology. Although our SLR did not reveal any evidence on how to implement telehealth solutions, we identified barriers and facilitators that may potentially play a role for the implementation of telehealth interventions into clinical practice.

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**Supplementary Appendix 1****Scoping review covering remote self-management, physical activity and follow-up interventions in RMD****1. Purpose**

To map the current research and knowledge gaps within remote care interventions in rheumatology and inform the outlined research questions in the systematic literature review.

**2. Search terms**

Exposure	Disease	Design
Telemedicine Remote Consultation Mobile Applications (telehealth or tele-health or telemedicine or tele-medicine or ehealth or e-health or mhealth or m-health) ((remote or virtual) (consult* or therap* or treatment* or monitor* or assess* or care or followup or follow-up)) (mobile (app or apps or application*)). (teleconferenc* or teleconferenc* or videoconferenc* or videoconferenc* or telecare or tele-care or teleconsult* or tele-consult*) (u-health or uhealth)	Rheumatology Rheumatic diseases	Randomized controlled trail Meta-analysis Meta synthesis Literature review Systematic review Narrative review

**3. Databases and search period**

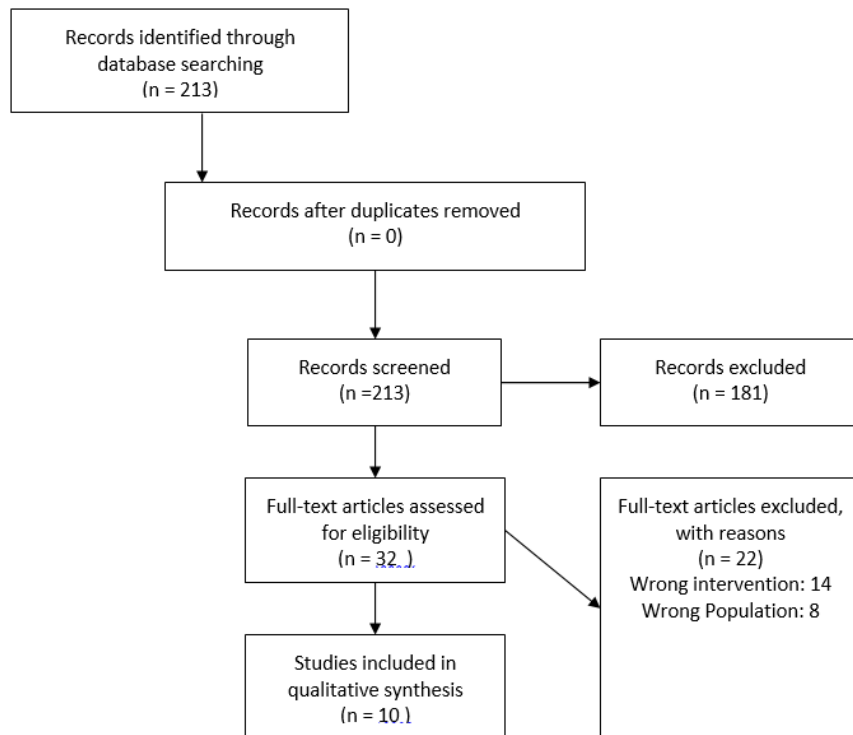
Cochrane and PubMed databases, from inception and onwards.

Search conducted in September/October 2020.



#### 4. Self-management and physical activity

##### 4.1 Prisma diagram



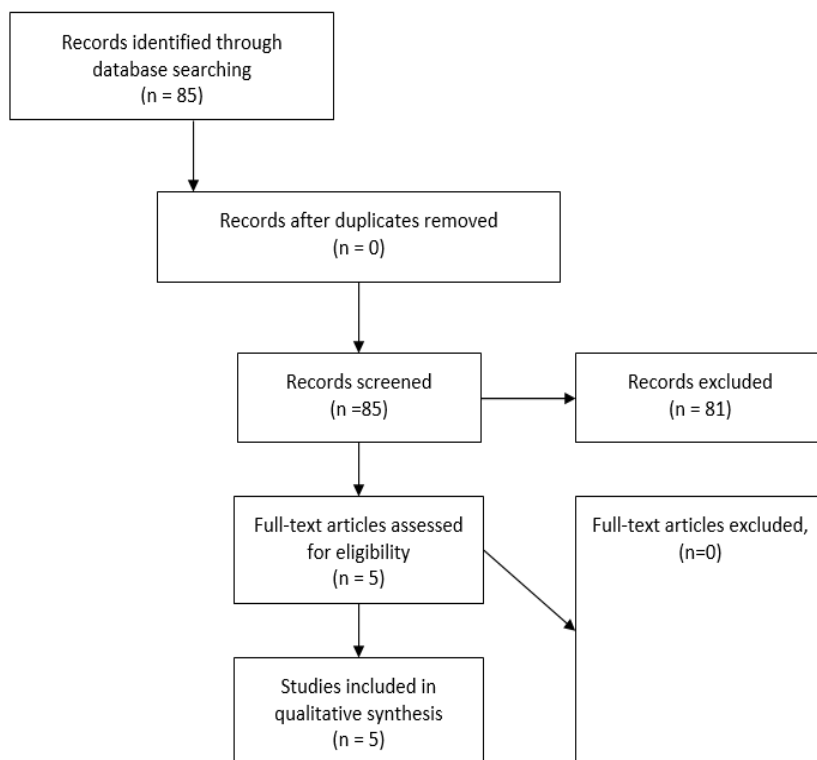
## 4.2 Included studies, self-management and physical activity

Self-management and physical activity, mixed diagnosis					
Study id, year	Study type	Included patients	Included studies	Intervention	Results
Najm et al, 2019 [1]	Systematic review	RA <sup>1</sup> , JIA <sup>1</sup> , OA <sup>3</sup> , FM <sup>4</sup> , PsA <sup>5</sup> , As <sup>6</sup>	N=11 (RCT: N=2)	Use of mHealth Apps in RMD <sup>7</sup>	OA: ↑ number of steps OA: ↓ pain FM: ↓ catastrophizing score
Fritsch et al, 2020 [2]	Systematic review and meta-analysis	OA, RA, FM	N=11 (RCT: N=11)	Use of text messages in RMDs	As a sole intervention: ↔ pain, physical function & QoL <sup>8</sup>  As part of an intervention ↓ pain, ↑ function, ↑ QoL
Piga et al, 2017 [3]	Systematic review	RA, SSc <sup>9</sup> , FM, OA, JIA	N=23 (RCT: N=9)	Remotely delivered self-management interventions	↑ Patient satisfaction ↑ Effectiveness (self-efficacy, QoL, physical function)
McDougallet al, 2017 [4]	Systematic review	IA <sup>10</sup> , PMR <sup>11</sup> , gout, CTD <sup>12</sup>	N=20 (RCT: N=1)	Remotely delivered disease management interventions	↔ due to limited evidence
Self-management and physical activity, OA					
Schäferet al, 2018 [5]	Systematic review and meta-analysis	Knee OA	N=7 (RCT: N=7)	eHealth supported exercise	↓ pain ↑ function ↑ QoL
O'Brien et al, 2018 [6]	Systematic review	Mixed OA	N=21 (RCT: N=20)	Mixed tele-health interventions	↓ pain ↓ disability
Safari et al, 2020 [7]	Systematic review and meta-analysis	Knee OA	N=8 (RCT: N=8)		↓ pain ↑ function ↑ QoL
Self-management and physical activity, RA					
Srikesvan et al, 2018 [8]	Systematic review	RA	N=6 (RCT: N=6)	Web-based rehabilitation	↓ pain ↑ function ↑ QoL
Self-management and physical activity, SLE					
Dantas et al, 2020 [9]	Systematic review	SLE <sup>13</sup>	N=11 (RCT: N=2)	mHealth Apps	↔ medication adherence ↑ Visit adherence ↓ BMI <sup>14</sup>
Self-management and physical activity, LBP					
Dario et al, 2017[10]	Systematic review and meta-analysis	LBP <sup>15</sup>	N=4 (RCT: N=4)	Mixed tele-health interventions	↓ pain ↑ function ↑ QoL

1 Rheumatoid arthritis; 2 Juvenile idiopathic arthritis; 3 Osteoarthritis; 4 Fibromyalgia; 5 Psoriatic arthritis; 6 Axial spondylarthritis; 7 Rheumatic and musculoskeletal diseases; 8: Quality of life; 9 Scleroderma; 10 Inflammatory arthritis; 11 Polymyalgia rheumatica; 12 Connective Tissue Disease; 13 Systemic lupus erythematosus; 14 Body mass index; 15 Low back pain

## 5. Remote follow-up in inflammatory arthritis

### 5.1. Prisma diagram



## 5.2 Included studies, remote follow-up

Remote follow-up, inflammatory arthritis								
Study id, year	Study type	N	Disease	Intervention	Control	Outcome	Follow-up, months	Results
El Miedany et al, 2016 [11]	RCT	224	Prevalent RA <sup>1</sup>	ePROM <sup>2</sup> based follow-up	Standard follow-up	DAS <sup>3</sup> -28	12	No difference
Taylor Gjevre et al, 2018 [12]	RCT	85	Prevalent RA	Video based follow-up	Standard follow-up	DAS-28	10	No difference
Gossec et al, 2017 [13]	RCT	320	Prevalent RA	ePROM based follow-up	Standard follow-up	RAID <sup>4</sup>	12	No difference
Salaffi et al, 2015 [14]	RCT	44	Incident RA	ePROM based ToT <sup>5</sup>	Standard follow-up	CIDAI <sup>6</sup>	12	Favours intervention
De Thurah et al, 2018 [15]	RCT	294	Prevalent RA	ePROM based follow-up	Standard follow-up	DAS-28	12	No difference

1 Rheumatoid arthritis; 2 electronic patient reported outcomes; 3 disease activity score; 4 rheumatoid arthritis disease impact; 5 treat to target; 6 Clinical disease activity index.

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Supplementary Table 1: Overview of the included studies supporting the PtC: intervention; health care professional groups; patient groups; modalities, techniques; drivers and barriers

Reference	Intervention	Delivered by	Patients	Modality	Synchrone (Yes/No)	Drivers	Barriers
<b>Disease monitoring</b>							
Pers et al, 2021[1]	Disease monitoring	Doctors	RA <sup>1</sup>	Mobile App	No	High flexibility. No travel time	Smartphone and digital skills required. No possibility of physical examination. Self-assessment training required.
Taylor-Gjevre et al, 2018[2]	Disease monitoring	Doctors	RA	Video conference	Yes	Visual contact. No travel time, high flexibility	Digital skills and Internet connection required. No possibility of physical examination. Self-assessment training required.
Salaffi et al, 2016[3]	Disease monitoring	Doctors	Early RA	Web	No	High flexibility. No travel time	Internet access and digital skills required. No possibility of physical examination. Self-assessment training required.
de Thurah et al, 2018[4]	Disease monitoring	Doctors and nurses	RA	Telephone/ Web	Yes	Simple telehealth, high flexibility. No travel time	Internet access and digital skills required. No possibility of physical examination. Self-assessment training required.
Wood et al, 2019[5]	Disease monitoring	Doctors	IA <sup>2</sup>	Video conference	Yes	Visual contact. No travel time, high flexibility	Digital skills and Internet connection required. No possibility of physical examination. Self-assessment training required.
<b>Diagnostics</b>							
Leggett et al, 2001[6]	Diagnostics	Doctors	RMD <sup>3</sup>	Video conference	Yes	Visual contact. No travel time, high flexibility	Digital skills and Internet connection required. No possibility of physical examination.
Nguyen-Ogahalai et al, 2018[7]	Diagnostics	Doctors	RMD	Video conference	Yes	Visual contact. No travel time, high flexibility	Digital skills and Internet connection required. No possibility of physical examination.
Peterson et al, 2019[8]	Diagnostics/classification of symptoms	Doctors	LBP <sup>4</sup>	Web	Yes	No travel time, high flexibility	Digital skills and Internet connection required. No possibility of physical examination.
<b>Physical activity and training</b>							
Bennel et al, 2017[9]	Telephone coaching, physical-activity	PT <sup>5</sup>	OA <sup>6</sup>	Telephone	Yes	Simple telehealth, easy to use, high accessibility. No travel time	No visual contact/instruction.
Amorim et al, 2019[10]	Motivating app to increase physical activity	PT	LBP	Mobile App	No	High flexibility. No travel time	Digital skills and smartphone required.
Skrepnik et al, 2017[11]	Motivating app to increase physical activity	PT	OA	Mobile App	No	High flexibility. No travel time	Digital skills and smartphone required.
Hinman et al, 2019[12]	Telephone coaching, physical-activity. Add on to F2F <sup>7</sup>	PT	OA	Telephone	No	Simple telehealth, easy to use, high flexibility. No travel time	No visual contact/instruction.
Kloek et al, 2019[13, 14]	Internet-delivered exercise. Add on to F2F	PT	OA	Web	No	High flexibility, possibility of repetition of patient education material. No travel time.	Digital skills and Internet connection required.
Odole et al, 2013[15]	Tele-physiotherapy	PT	OA	Telephone	No	Simple telehealth, easy to use, high accessibility. No travel time	No possibility of physical examination. Digital skills and smartphone required
<b>Rehabilitation/ self-management</b>							
Cuperus et al, 2015, 2016[16, 17]	Tele-rehabilitation, self-management and goal setting. Add on to F2F	PT, OT, dietician and nurse	OA	Telephone	No	Simple telehealth, easy to use, high flexibility. No travel time.	No visual contact/no physical examination or instruction.

Azma et al, 2017[18]	Tele-rehabilitation	PT and doctor	OA	Telephone	No	Simple telehealth, easy to use, high flexibility. No travel time.	No visual contact/no physical examination or instruction.
Geraghty et al, 2017[19]	Internet-delivered self-management and goal setting program	PT	LBP	Web	No	High flexibility, possibility of repetition of patient education material. No travel time	No visual contact/no physical examination, instruction. Digital skills and internet connection required.
O'Brien et al, 2018[20]	Telephone-based weight loss support	HPRs including dietetics, PTs and psychologists	OA	Telephone	No	Simple telehealth, easy to use, high flexibility. No travel time.	No visual contact/instruction.
Friesen et al, 2017[21]	Internet-delivered cognitive behavioral pain management	Non-clinicians	FM <sup>8</sup>	Web	No	High flexibility, possibility of repetition of patient education material. No travel time	Digital skills and Internet connection required.
Ammerlaan et al, 2014[22]	Self-management support	Not specified	Adolescents, IA	Web	No	Flexibility, possibility of repetition of patient education material. No travel time	Digital skills and Internet connection required.
Shebib et al, 2019[23]	Tele-rehabilitation	PT	LBP	Mobile App	No	Simple telehealth, easy to use, high accessibility.	Digital skills and smartphone required. No possibility of physical examination.
Berdal et al, 2018[24]	Tele-rehabilitation and goal planning. Add on to F2F	Doctor, PT, OT, nurse	RMD	Telephone	No	Simple telehealth, easy to use, high accessibility. No travel time.	Digital skills.
Nero et al, 2017[25]	Tele-rehabilitation	PT	OA	Web	No	Simple telehealth, easy to use, high accessibility.	Digital skills, smartphone or internet connection required.
<b>Motivation, communication and cognitive behavioral therapy (CBT)</b>							
Rutledge et al, 2018 [26]	Telephone CBT <sup>9</sup>	Non-clinicians	LBP	Telephone	Yes	Simple telehealth, easy to use. No travel time	No visual contact.
Solomon et al, 2010 [27]	Motivating to adherence	Not specified	OP <sup>10</sup>	E-mail/telephone	No	Simple telehealth, easy to use, high flexibility, No travel time	Access to email required.
Gossec et al, 2018[28]	Internet-delivered platform for patient-physician interaction	Doctors	RA	Web	No	High flexibility, possibility of pre-request of data	Self-assessment training required. Digital skills and Internet connection required.
Tso et al, 2015[29]	Motivating to adherence	Pharmacists	OP	Telephone	No	Simple telehealth, easy to use. No travel time	No visual contact.
Vallejo et al, 2015[30]	Internet-based CBT	PT, psychologist	FM	Web	No	Flexibility, possibility of repetition of patient education material. No travel time	Digital skills and Internet connection required.
Khan et al, 2020[31]	Digital coaching	Not specified	SLE <sup>11</sup>	Mobile App	No	Simple telehealth, easy to use. No travel time.	Smartphone and digital skills required. Self-assessment training required.
<b>Patient education</b>							
Kennedy et al, 2017[32]	Patient education	PT	IA	Video conference	Yes	Flexibility. No travel time	Digital skills and Internet connection required.
Song et al, 2020[33]	Patient education, adherence and disease activity	Nurses	RA	Telephone	No	Simple telehealth, easy to use, flexibility. No travel time	No physical contact.

1 Rheumatoid arthritis 2 Inflammatory arthritis 3 rheumatic and musculoskeletal diseases 4 Low back pain 5 Physio therapist 6 Osteoarthritis 7 Face-to-face visit 8 Fibromyalgia 9 Cognitive Behavioural Therapy 10 Osteoporosis 11 Systemic lupus erythematosus

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